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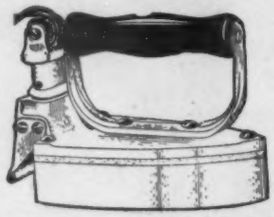

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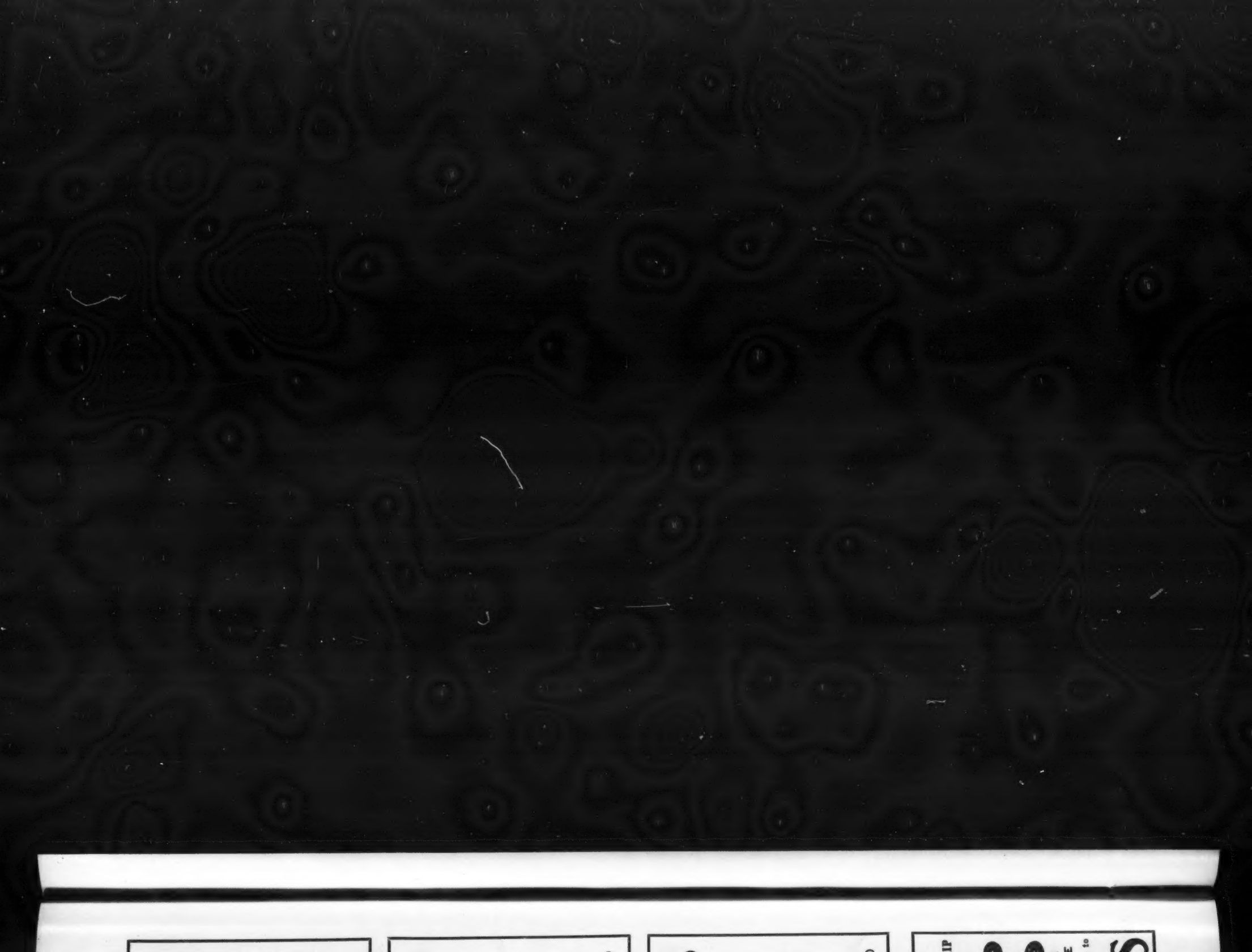

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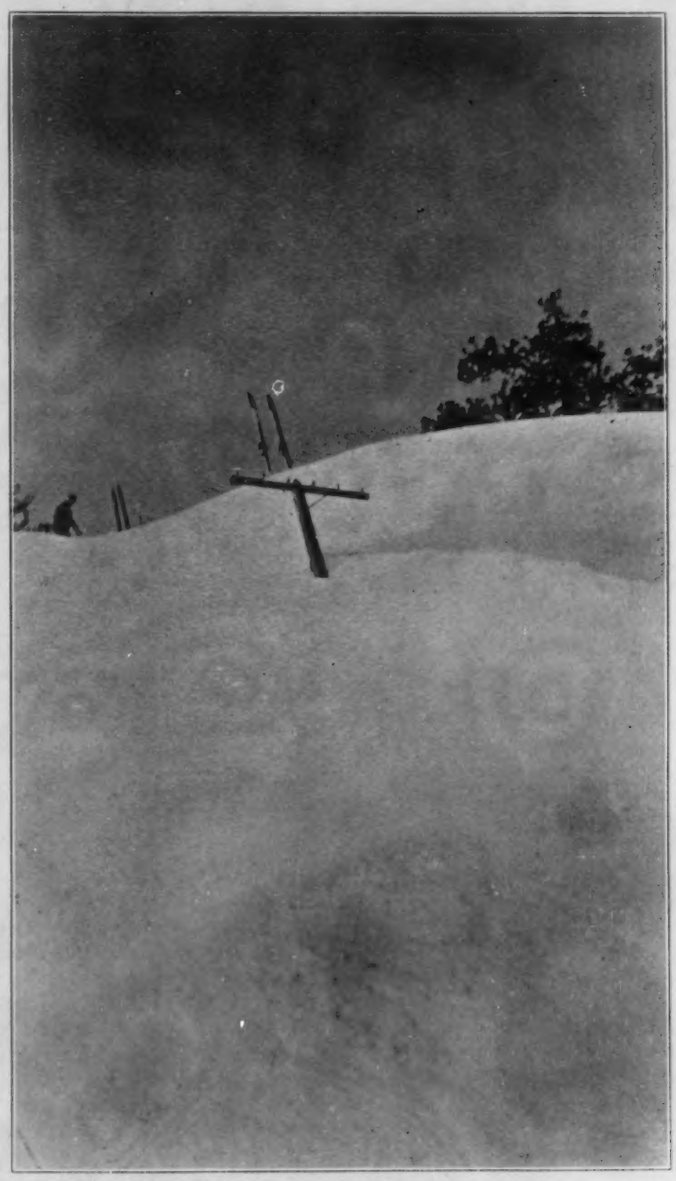
VOLUME XXII. SAN FRANCISCO, FEBRUARY 13, 1909 NUMBER 7

THE EFFECT OF SNOW-LOAD ON TELEPHONE AND TELEGRAPH LINES

By M. KAWARA.

An interesting paper on snow load on telephone and telegraph lines was presented at the recent meeting of the Electric Science Association at Tokio by Mr. S. Kanda. He has been a government engineer for twenty-five years. Below is an abstract of his paper.

Damages done by snow are quite frequent and severe, particularly in 1908. On February 9th the lines in Atlanta, Ga., and its vicinity were damaged to a considerable extent, causing great confusion and inconvenience. On February 29th, around Somerset, England, large damages were done by snow; again on March 3d, in Wiltshire, England, snow caused wreckage of many poles and lines. In this latter instance, some iron poles were badly bent and many were brought down flat to the ground. How extensive the damages were can be realized when we learn that the repair work took ten days and nights. In Michigan, Ohio and Iowa many lines suffered similarly from snow in March. The severe snowstorm of April 9th around Tokio did more damage than any other so far as known in Japan. These occurrences warrant careful study of effects of snow load on telephone and telegraph lines.



Telephone Pole in Sierra Nevada Mountains which was 8 feet Under Snow Before Shovelling was started.

The Tokio snowstorm was confined within the radius of about twenty miles; and yet in this small area the damaged poles numbered over 1000, and cross arms 1300. Of 17,000 telephone subscribers in Tokio, only 5800 remained intact, the rest being put out of commission temporarily, and the broken telephone lines alone numbered 280,000. A careful study on damaged poles showed the fact that most poles break either near the ground or at the lowest groove cut for cross arm. Tipping of poles was numerous; and this seems to be the first step toward breaking, for as will be shown later poles have very little resistance against horizontal stresses, and as soon as the vertical stress acts off the axis of the pole, the force tending to bend or tip increases enormously, the final result being the complete wreckage. Many copper telephone lines were not able to sustain the weight of accumulating snow and in some places iron telegraph wires, weighing 400 pounds to the mile, broke simply of snow load.

In this connection experience with hailstones may be of interest. Heavy hailstones fell around Tokio in last June. Again, many telephone and telegraph lines were broken from impact of heavy hailstones. Some hailstone specimens picked at random measured from two to three inches in diameter. The largest one is reported to have weighed a little over five pounds. Such hailstorms are, however, of very rare occurrence, and no provision can be made to guard against them on economical reasons.

The specific gravity of snow is variously stated by different authorities. The report from a Japanese observatory says that snow in the months of January and February has a specific gravity of 0.05, in November and March 0.06, and in April 0.14. The snow in the recent snowstorm around Tokio weighed 16.2 pounds per cubic foot, or had a specific gravity of 0.26. This was apparently due to the large amount of water it contained.

The quantity of snow that can stick and stay on the line is chiefly determined by circumstances. In the recent storm above referred to, it clung to the line approximately circular in form and its diameter measured 3¼ inches. (Mr. Abbot states in his Telephony that average snow coating is from ⅛ to ¼ inch.) In exceptional cases, it is reported that six, eight, and even a foot of frozen snow on lines were observed. Therefore, it appears necessary to provide for about 6 inch snow load on each line. If we assume a density of 30 pounds per cubic foot, which seems to be reasonable, the weight of snow per foot of line becomes about 6 pounds, or 900 pounds for 150 feet span. This will produce about 15,000 pounds on each pole with 20 lines. From Euler's formula it can be shown that this vertical load calls for 9 inch diameter pole if the height is 18 feet. The following, Table I, shows the maximum allowable vertical load:

TABLE I.

l	D	V
18	9	14,681
20	10	18,129
22	11	21,931
24	12	26,100
28	14	35,522
30	16	40,781

TABLE II.

a	n
100	52
120	43
150	35
180	29
210	25
240	21
270	19
300	17

l = height above ground in feet.

D = diameter of pole in inches.

V = allowable vertical load in pounds.

If l be assumed to be 24 feet, D 12 inches, the number of iron wires, weighing 400 pounds to the mile, that can be strung on safely against a snow load of 5½ inches diameter is shown in Table II, in which n is the number of wires and a the pole span in feet.

It is known that the resistance of a pole against a horizontal force is

$$H = \frac{\pi R^3 T}{K l},$$

in which R = radius of pole, T = resistance to rupture per unit of pole material, l = height above ground, and K = constant depending upon the pole material and the units of measure used. Mr. Kanda gives values of H for cedar poles commonly used, as in Table III. If we take again the case of 24 feet 12 inch pole, the allowable horizontal stress is 3240 pounds. This is only

TABLE III.

l/D	9	10	11	12	13	14	15	16	17
20	1640	2250	2995	3888	4948	6174	7594	9216	11154
22	1493	2048	2726	3585	4498	5613	6904	8376	10040
24	1368	1877	2498	3240	4123	5141	6328	7680	9212
26	1269	1722	2292	2991	3806	4672	5841	7089	8503
28	1171	1607	2139	2777	3534	4410	5427	6583	7896
30	1092	1499	1995	2592	3299	4116	5062	6144	7369

one-eighth of the corresponding vertical stress. Hence it appears to be safer to determine the diameter of poles with reference to probable horizontal stresses. This is, however, hard to estimate. For even if we assume that all vertical loads act through the axis of the pole (which is not generally the case), breaking of wires, or snow load being blown off on one side of the pole, will cause considerable horizontal stress. Again, when strong wind blows laterally at the time the lines are loaded with frozen snow, the wind pressure acting on the pole will be enormous. Such being the case, perfectly safe pole lines against all possible dangers are impossible to build on economical reasons. However, observance of the following simple rules will minimize annoyance and trouble to some extent. First, adopt as short and equal span as possible; second, lines ought to be as near level as practicable; third, soft, swampy places are to be avoided; fourth, guy wires are useful and ought to be placed at frequent intervals; fifth, make grooves for cross arms as shallow as permissible; sixth, make radii of curvature at curves large; poles ought to be straight.

PRELIMINARY REPORT ON TELEPHONES.

Continental United States

(Exclusive of Alaska, Hawaii, Philippine Islands and Porto Rico)

The statistics relate to the years ending December 31, 1907, and 1902. The totals include reports of all commercial and mutual systems and farmer or rural lines, but do not include reports of telephone lines operated by steam and electric railways; nor do they include reports of isolated systems operated exclusively for the benefit of commercial and manufacturing enterprises, federal, state, and municipal governments.

	1907.	1902.	Per cent of increase.
Number of systems and lines (1)	22,971	9,136	151.4
Miles of single wire	12,999,369	4,900,451	165.3
Number of stations or telephones, total	6,118,578	2,371,044	158.1
Bell (American T. & T. Company)	(2) 3,132,063	1,317,178	137.8
Independent (non-Bell)	2,986,515	1,053,866	183.4
Number of public exchanges	15,527	10,361	49.9
Number of switchboards (total)	16,065	10,896	47.4
Common battery service	2,146	837	156.4
Magneto system	13,801	10,005	37.9
Automatic	118	54	118.5
Estimated messages or talks during year, total	11,372,605,063	5,070,554,553	124.3
Local exchange messages	11,119,867,172	4,949,849,709	124.7
Long distance and toll messages	252,737,891	120,704,844	109.4
Total income (3)	$184,461,747	$86,825,536	112.5
Total expenses (including taxes, interest and fixed charges)	$140,802,305	$65,164,771	116.1
Total cost of construction and equipment, including real estate and telephone	$819,667,008	$389,278,232	110.6
Capitalization:			
Capital stock authorized par value	$1,121,931,023	$384,534,066	191.8
Capital stock outstanding, par value	$512,685,265	$274,049,697	87.1
Dividends on stock	$23,733,670	$14,982,719	58.4
Bonds authorized, par value	$556,537,932	$158,099,094	252.0
Bonds outstanding, par value	$301,930,739	$73,981,361	308.1
Interest on bonds	$12,316,109	$3,511,948	250.7
Total par value stock and bonds outstanding	$814,616,004	$348,031,058	134.1
Employees and wages:			
Salaried employees, number	25,298	14,124	79.1
Salaries	$19,298,423	$9,885,886	95.2
Wage-earners, average number	118,871	64,628	83.9
Wages	$48,980,704	$26,369,735	85.7

1. The statistics of farmer or rural lines included in this report are confined to number of lines, miles of wire and number of telephones: 1907—17,702 lines, 486,294 miles of wire, 565,649 telephones; 1902—4,985 lines, 49,965 miles of wire, 55,747 telephones. It is probable that a more thorough canvass was made of these lines in 1907 than in 1902, which accounts in part for the large increase.

2. Exclusive of 85,287 farmer or rural stations receiving exchange service through switchboards of "Bell" Companies. A large proportion of these stations were reported as and included in total stations for independent (non-Bell) systems.

3. Includes assessments of mutual systems.

[1]Report of Bureau of the Census.

The final report for 1907 will contain an analysis of the above totals and present detail statistics for other phases of the industry.

In the parks of Chicago it has been found difficult for the cleaning force to keep the boulevards properly swept owing to the great amount of automobile traffic during the daylight hours, and the principal work is now being done at night. In order to prevent the running down of the members of the cleaning force in the darkness, each worker is equipped with a small incandescent lamp placed upon the top of his helmet which is supplied with current from a portable battery carried in his pocket. When the New York City street cleaning force adopted a white uniform for regular wear they were promptly classified as the "White Wings." The public have a happy way of selecting appropriate designations in such cases and they just as promptly dubbed the electric lighted street cleaners in the Chicago parks the "Fire Fly Brigade." This name is particularly appropriate, and "Fire Flies" they will probably be until the end of time.

A REPORT ON METHODS OF TELEPHONE ACCOUNTING.

D. C. & W. B. Jackson, and Arthur Young & Company, the consulting accountants for Chicago, have filed a report on proposed methods of accounting for the telephone system. The proposed new telephone ordinance reserves to the City Council comprehensive powers in the adjustment, changing and regulation of telephone rates after 30 months from the company's acceptance of the ordinance, which was December 1, 1907, and thereafter at intervals of five years. For the purpose of an intelligent exercise of the right to regulate rates at the end of 30 months it is considered important that the information produced for the city shall particularly exhibit: (1) the investment required for furnishing each class of telephone service; (2) the cost of furnishing each class of service rendered, and (3) the revenue derived from each class for service rendered. The ordinance clothes the city comptroller with authority to prescribe the form and manner of keeping accounts and records by the company, and the report is in conformity with this authority. The object of the report is to formulate a system of keeping records and accounts to be adopted by the telephone company so that all the facts, data and information necessary to make proper and reasonable regulation of rates may be furnished to the city.

A more comprehensive system of record keeping and accounting than has heretofore been introduced by any telephone company is required to make apportionment of costs among the many different classes of service established by the ordinance, and this report is in a sense without the guide of precedent. To accomplish the purpose, the costs of giving service must be separated and properly apportioned among the different classes of service. The rate schedule of the ordinance requires the company to maintain a comprehensive service suited to all classes of users, which analyses into 15 different classes of service for "Chicago Exchange" users, seven classes of service for "Neighborhood Exchange" users, and two special classes embracing private lines and mileage extension lines. These are enumerated in detail in the report. They are all for service within the city. Toll service to points outside of the city is additional thereto.

The city probably will eventually desire to have a complete inventory and appraisal of the physical property of the telephone company. However, the plan of accounting laid out in the report expects that suitable subdivisions of the plant may be reached through accepting the divisions found in the telephone company's accounts, and deriving the further subdivisions by mathematical processes and engineering estimates. This will serve all the needs of the present, and a complete inventory can be ordered when the city finds that it would be desirable.

The investment and operating cost for telephone service may be divided into two principal parts: (1) a part which may be assumed to be independent of the amount of use of the telephones and is fixed for any class of service in substantial accordance with the apparatus required to give the type of service for that class, and (2) the remaining part dependent almost directly on the amount of use of the telephones; that is, on the extent of the telephone traffic. Illustrative examples indicating the necessity of this subdivision are given in the report. The phrase "Readiness to Serve" is adopted in the report to indicate the first part, and the phrase "Service Rendered" to indicate the second part. The setting apart of these two parts of plant from each other is difficult because of the lack of adequate means for keeping separate records of messages belonging to each class of service. The company maintains a count of the messages from all of those subscribers whose bills are based on messages, and it therefore keeps data from which a record may be made of the messages originated by each coin-box class of service and by each of the regular measured-rate classes (omitting the commuted rate lines). It also makes a monthly count (called a "peg count") of all calls for one day in the month, but this gives no information as to the relative number of messages originated by the various flat-rate classes of service of the commuted lines.

The importance of obtaining a true record of the messages originated in each of the latter classes of service will be understood when it is known that much the greater part of the traffic handled by the company's central office comes from the flat-rate and commuted-rate lines. The results of a recent peg count taken at central offices serving the business part of the city show that 17,011 lines in these classes originated no less than 632,796 calls during 24 hours, while the 36,668 measured-rate lines of the same central offices originated only 400,356 calls during the same 24 hours. Similar results are exhibited by the records of all the monthly peg counts.

As already indicated, a large part of the cost of giving service is proportional to the amount of the traffic, and it is an essential feature of the plan presented in the report that the records of traffic shall be complete. The great disparity in the traffic of the different classes must make a large difference in the cost of service, and the conditions relating to the cost in the different classes cannot be adequately known until arrangements have been devised for keeping classified records of the messages originated by the flat-rate and commuted-rate subscribers, as well as the others. The most satisfactory way of doing this is by putting a message register or meter on every flat-rate and commuted-rate line; but, owing to the fact that message registers are not yet installed, the company should organize a special force of clerks for counting and supervising the counting of these messages until registers are installed. The report points out that the company is now taking steps to organize such a force.

It is obvious that over 170,000 telephones cannot be considered individually, one by one, on account of the insuperable difficulty and cost of keeping records, but that they must be considered in groups of similar character. These groups are fixed by the schedule of rates imposed on the company by the ordinance. The service to meet each subscriber's needs most economically can be obtained by him from some one of the classes of service of the rate schedule, and subscribers of reasonably similar requirements are therefore attracted together in groups corresponding to the rate classes. The rates are so numerous and carefully adjusted that every user can get telephone service adapted to his needs. It is therefore convenient and proper to adapt the accounting methods so as to arrive at the average cost of service for each of these classes. In pursuance of this object the report shows a plan for apportioning the company's investment among the same classes, and segregating the revenue according to the classes.

No inter-works telephone system is used by the Hening-Hall-Marvin Safe Co. of Hamilton, Ohio. C. M. Carpenter, president of the company, argues "That a foreman will not work so far on his own responsibility with a telephone at his elbow as he will if he must walk to the general office when he wishes to speak with his superintendent. We believe that a telephone system in a factory will waste as much time by making possible useless intercourse, as it will save by giving added facility. It is the facility that causes the waste. When it is hard to spend money, it is much easier to save it—and so it is with time. Again, without the telephone we throw the superintendent into more intimate and personal relation with his men. By going into various departments, instead of talking into them, his presence has a good effect on the activities of the works. When he goes to see the condition of work and progress obtained, it is not possible for foremen to give excuses that might be accepted over the telephone."

A license tax for telephone companies is required in Oregon. The Pacific States T. & T. Co. has lost in both the Circuit and Supreme Courts in Oregon in questioning the constitutionality of the initiative and referendum amendment adopted by the people in 1906. The company is required to pay the annual license tax of 2% upon its gross receipts and to make annual statements to the State Treasurer. This decision will probably be appealed to the Supreme Court of the United States.

LOCAL TRAFFIC.[1]

By A. J. Shands

The subject of local traffic is quite large, and to deal with it properly one would have to start from the very beginning and go through it step by step. Just where the beginning would be is a matter of opinion. Some would say the beginning is with the switchboard specifications, and that is not too early to begin, but as that seems to be more engineering than operation, we will begin with the new applicant.

The selection from applicants of persons to become student operators is not as easy a problem as might be expected. In selecting from the many applicants a few to become operators, a great deal must be considered. A thing that should not be lost sight of for an instant is that the selection is one that is going to affect the company in the future. Will the applicant be an operator up to the required standard? Do her general actions indicate that she will be quick and active enough to handle the number of calls expected of all operators in time? Does her tone of voice, her accent, impress you in a way that makes you think that she is a person that is fitted for the place of representing the company in handling its greatest asset, the best advertisement that a telephone company has, and do this in a way so that the public (the ones that are to be pleased) will say your service is good service?

It is a grave mistake to admit an applicant just because she is recommended by some one who is connected with the company, or for a similar reason, if she does not come up to the necessary requirement. These cases not only cost the company money by trying them or giving them a chance, but take up a great deal of time that is also a dead loss. Operators from this class will almost invariably do more to break down good service than they will to maintain or improve it.

All these things having been considered, together with her height, sight, etc., and the applicant having been employed, then come the first instructions. The student is taught the meaning of the words jacks, cords, keys, etc., is taught to select numbers in the multiple, and the various symbols and markings, and it is not so very long before she recognizes these in a mechanical sort of way. But this is not true with the words or phrases she is taught to use. It is not hard for her to learn the wording of the phrases to be used when the different conditions arise, but to use these phrases with the proper accent and in the proper tone of voice seems to be more difficult. At this point the student should be so thoroughly drilled that she will not only use the phrase correctly worded, but with an accent that carries courtesy in every word. Operators generally do not seem to realize that they control the temperament of the telephone users to a great extent. At least they do not always take advantage of this, as is shown by curt or expressionless replies that are made. A little courtesy costs nothing, and goes a long way toward making our work more pleasant.

After the student has been taught the different markings, phrases, etc., and knows how to operate from the practice she has had, she is passed to the board and her work should be supervised by a supervisor or an older operator. But care should be taken in selecting the operator in whose care she is to be placed. Many employees are very good operators, but very poor when it comes to telling others how to operate. A promising student can be very not the necessary patience and the knack of correcting or coaching her in a way that will show her her mistakes, easily discouraged if she is placed with some one who has but will not offend her or injure her feelings. Student operators are frequently very sensitive until they have acquired confidence. An experienced operator who does not take kindly to coaching students is quite likely to pass a student along as competent too soon, just to relieve herself of work that is irksome to her, and cases of this kind affect the service more than is generally realized. Start the student right and it is not much trouble to keep her right, but let her get away from the instructions or from her own ideas concretely early in her career as an operator, and there is but one of two alternatives—start her all over again, or worry along until she finally ceases to be an operator for one reason or another.

Having coached the student to the point of self-confidence, through the medium of the instructor and the senior operator or supervisor, the next step of placing her in a position to depend upon herself, or nearly so, is equally as delicate as moving her from the instructor's board to the board proper. In most exchanges, especially the larger ones, the load is distributed as equally as possible in all positions; therefore it is necessary that the student take up a position the same as would a more experienced operator, and in placing her the supervisor should be careful to know the disposition of the operators on either side. Should the student be placed between two who will not help her by answering some of her calls, and showing her how to help herself, she is liable to feel the task too great; but if the conditions be the opposite, she will begin to acquire more confidence and speed from the start. Too much thought cannot be given to the first instructions to operators and the subsequent development up to the time they are expected to be competent or capable of caring for the work according to their length of service. A good start is a thing half done.

From this time on the operators are in charge of the chief operators or supervisors and are expected to improve, not alone in accuracy and speed as their length of service increases, but in following instructions that were given before, and the importance of which the student operators do not appreciate. Good service does not only mean quick attention from the operators and connections between the different stations, but means all of this together with the avoidance of unnecessary interruptions. Interruptions are caused by the operators, and their occurrence can be minimized by carefulness on the part of the operators. It is the interruptions caused by cord, key, line, or other troubles which are annoying to subscribers, and which operators frequently notice but do not fully realize what these troubles, even those that appear the most trivial, mean to themselves in their work and to the service. A case of trouble noticed by an operator should be reported by her and reported again every time she notices it, if it is not repaired within a reasonable time after her first report. In large exchanges, about one per cent of the calls cannot be completed, and basing the foregoing statement on this item alone, it will be generally admitted by managers of large exchanges that their "Can't Raise" reports do not equal one per cent of the originating calls. The necessity of team work should be thoroughly explained to the operators. In order to have a uniform answering time, the operators must help each other as much as possible, and the reason for this should be made clear. It is not good practice to tell an operator that she must help the operators on either side of her in just those words, but make it clear that the object is uniformity of answering service, and to gain this one should help the other as much as possible, and by doing this they are helping themselves.

Office discipline and the conduct of the operators, both in the operating room and recreation room, are subjects of importance, and are usually governed by the local conditions with the exception of operators' privileges at the board, and this is a point that modern apparatus has taken care of in itself to a large extent, particularly in the larger exchanges. Operators cannot be permitted to talk to each other while on duty, unless the work demands it, and that

[1] Paper presented at the convention of the International Independent Telephone Association, December 1, 1908.

is seldom. The work in larger exchanges is usually so arranged that there is very little time for personal conversation.

Chief operators and supervisors are placed in charge of the operators, and their duties in part are to see that the operators handle the subscribers' calls according to the instructions given them, to maintain efficient discipline, etc.; but their work does not stop there. They are held responsible for the service given by the operator, and to do this it is necessary that their knowledge of handling traffic must be used. A supervisor cannot give good service if the work of her operators is not good, neither can she give good service if the positions in her division are overloaded during the busiest hours or at frequent intervals during the day. These conditions are not always shown on peg count day, and it is to the supervisor or chief operator that the manager looks for information of these irregular conditions.

In selecting chief operators and supervisors, many things must be considered. A good operator does not always make a good supervisor. It is well, as far as possible, to advance the operators according to their length of service, but this can only be one of the things to consider and by no means should it be allowed to offset any of the other qualities that are so important and which some younger operators may have.

The supervisor should be a good operator—not necessarily one of the quickest—careful in her work, one who has judgment in dealing with the irregular conditions as they arise, and a person who can handle other operators in a way that will cause them to do their best work when she is not watching them as well as when she is. A supervisor who has not the ability, either natural or cultivated, to coach, correct, or reprimand her operators in a way that is not humiliating to or is inwardly resented by them has a difficult time in giving a good service.

In branch exchange systems where "B" or trunk operators are necessary, the selection of these operators is made from the local board of operators, but the requirements are not the same. To select the best "A" operator for "B" work seems the logical thing to do, but this does not always work out as expected. On the "A" board an operator may do good work, but there she controls the number of persons who can talk to her at one time, but on the "B" position it is quite different. And although one is a good "A" operator, she may not be much of a success on the "B" board, simply because she is easily excited or confused. The "B" operator must necessarily be quick to think and quick to act. There are times when the loss of self-control on her part would materially affect the service of some branch office for several minutes. The "B" operator should feel that she is a part of the office whose wire she is handling, and if in full sympathy with them, she will be able to do much to help that office give a good service to the subscribers of that district.

The words "Peg Counts" do not have much meaning to the operators, and sometimes not to the chief operators, and it is usually for the reason that they do not understand why they are taken. From the regular peg counts that are taken a chart is made, and while this shows the changes, gain or loss, from some previous count, and is interesting and useful, the greatest value can be had from the sheets that show the counts as taken by hours, or half hours, as they may be, and the numbers of hours and minutes that the operators worked—the detail sheets. From these sheets the office manager can learn the conditions of each position, not as an average, but as they are at any hour. From these sheets it is frequently suggested that further counts be made for certain hours, or, on some positions, at irregular hours. The distribution of the work over the board and the number of operators necessary are shown.

FOREST SERVICE TELEPHONE LINES IN OREGON AND WASHINGTON.

By W. E. Herring.[1]

Forest Service lines are only constructed in those parts of the country where the field is not covered by commercial companies, and where the business which would be obtained will not justify the construction of a commercial line.

The Forest Service has a general contract with all the large telephone companies by means of which they are enabled to connect with their exchanges or switchboards, and the Government line is treated to a certain extent as a commercial line.

The headquarters of many of the Forest officers are in isolated parts of the country, and in some cases it takes three weeks for an answer to be received to a letter sent by the Supervisor to the Forest officer, although the distance may not exceed 60 or 70 miles. In case of fire it is imperative that help be secured to aid in fighting it. It was in order to remedy this situation and to facilitate the administration of the Forest that the construction of telephone lines was begun. The line most commonly used is a grounded line of No. 12 BB galvanized iron wire. In some cases swinging insulators are used, attached to trees, but in a majority of the cases where not in a heavily timbered country, a pole line is constructed.

The necessity for telephone lines is thoroughly realized, and the help which they have been in different parts of the country during the past year have fully warranted their construction. In one case alone by means of a portable test set, which are used extensively, a Ranger was enabled to summon help from a point 43 miles away, and by doing so a fire which would have proved very disastrous was checked and finally controlled.

Following is a list of telephone lines constructed by the Forest Service in Oregon and Washington:

Oregon.

Cascade National Forest: From Lowell to J. W. Hill ranch, via Hazeldell, 20½ miles, metallic circuit.

Crater National Forest: From Ashland to Ashland Butte Ranger Station, 15 miles along Ashland Creek, grounded circuit. In addition there is about 15 miles of other line on this Forest.

Deschutes National Forest: From Sugar Creek Ranger Station to a connection with a private line near Howard, Oregon, 27 miles, grounded circuit.

Oregon National Forest: From Portland, Oregon, connecting with the city of Portland Water Works' line, seven miles, metallic circuit. From Dufur to Wards' mill, thence to a Ranger Station, 15 miles, grounded circuit. From Sisters, Oregon, to Allingham, 18 miles, grounded circuit.

Umpqua National Forest: From Roseburg eastward via Peel to Black Rock Ranger Station, 70 miles, metallic circuit.

Wallowa National Forest: From Wallowa to Sled Springs, thence to Chico, thence to a Ranger Station, 53 miles, grounded circuit. A short line from Halfway to Cornucopia, nine miles, grounded circuit.

Whitman National Forest: From Sumpter to Cableville and Starkey, with branches, 35 miles, grounded circuit.

Washington.

Chelan National Forest: From Chelan to Stehekin, along the southwest shore of Lake Chelan, 52 miles, grounded circuit.

Colville National Forest: From Republic to Wauconda, with branches, 50 miles, metallic circuit.

All of these lines connect with commercial lines either at exchanges of the Commercial Company, or direct with their line.

A line is under construction from Portland to Gresham, Sandy, and thence over the Divide into the Oregon National Forest, with several branches which will have a total length of 122 miles, copper metallic circuit.

A number of other lines are contemplated on the different Forests in these two States which will be taken up during the spring and summer.

During the fiscal year ending June 30, 1908, over 2500 miles

[1]District Engineer Forestry Department.

of telephone line was constructed on the National Forests, and since that time the construction of 1387 miles of additional telephone line has been authorized. The majority of this has been completed and is in operation, the balance will be completed before June 30, 1909.

This briefly covers the telephone situation in detail in Washington and Oregon, and in a general way in the balance of the western part of the country.

MEETING OF INDEPENDENT TELEPHONE MEN IN BOSTON.

At a conference held at the Hotel Bellevue, Boston, on January 23rd, independent telephone men were present representing an invested capital of about $400,000,000.00. The conference was presided over by Mr. B. G. Hubbell of Buffalo, President of the Conference Committee.

The organization of a comprehensive system for handling long distance traffic was one of the first questions taken up, and in order to facilitate this work it was planned to organize a company to issue interchangeable long distance coupons which will be accepted by all independent companies of the country.

A company was incorporated in Ohio, with C. Y. McVey of the Cuyahoga and United States Company of Cleveland as President, which will take charge of clearing the business. It will be known as the International Independent Telephone Accounting Company, issuing coupon books on the plan of railroad mileage, recognized by companies in Pennsylvania, Michigan, New York, Kansas, West Virginia, Minnesota and Ohio. The companies operating under this arrangement represent about 360,000 miles of wire.

It was the sense of the conference that the present time is favorable for the telephone industry, and that there is ample room for both organizations in the field. While there can be no affiliation between the two, the separate organizations can without industrial warfare find plenty of business to take care of.

The conference went on record as believing in competition, as by competition alone can satisfactory service be made possible. It was the consensus of opinion that there is a greater demand for telephone service than both organizations can now supply and that the plan to be followed by the independents will be that of offering good service at fair rates and allowing the competition to take care of itself.

In the evening a banquet was held at the Parker House, presided over by Mr. A. G. Bean, president of the Metropolitan Home of Boston. The majority of the speakers voiced the need of independent telephone service in the East, especially in Boston, and referred to the success of competition in the West. The principal point commented upon by the speakers was the immense field yet undeveloped in telephone construction, and attention was called to the fact that there is practically no telephone company in the country today that has not a waiting list of applicants for service.

Among those present at the conference, representing the larger companies, were: B. G. Hubbell, Buffalo, chairman; E. L. Barber, Wauscon, O.; A. E. Barker, Detroit, Mich.; F. L. Beam, Mt. Vernon, O.; J. S. Bradley Jr., Toledo, O.; C. C. Cockerill, Jefferson, Ia.; H. D. Critchfield, Chicago; A. C. Davis, Parkersburg, W. Va.; E. B. Fisher, Grand Rapids, Mich.; G. R. Fuller, Rochester, N. Y.; I. H. Griswold, Albany, N. Y.; W. C. Hanlan, Wheeling, W. Va.; J. B. Hoge, Cleveland, O.; F. D. Houck, Harrisburg, Pa.; W. R. McCanne, Rochester, N. Y.; W. J. Melchers, Alma, Mich.; M. Koehler, St. Louis, Mo.; G. R. Johnstown, Columbus, O.; C. Y. McVey, Cleveland, O.; E. H. Moulton, Minneapolis, Minn.; L. G. Parker, Louisville, Ky.; H. L. Reber, St. Louis; J. C. Reber, Dayton, O.; O. C. Snyder, Kansas City, Mo.; J. G. Splane, Pittsburg, Pa.; H. C. Stifel, St. Louis; C. E. Tarte, Grand Rapids, Mich.; Charles West, Allentown, Pa.; Charles Wilson, Philadelphia; F. H. Woods, Lincoln, Neb. The conference was arranged by Bernard M. Wolf and Alfred S. Hayes, of the Metropolitan Home Telephone Company, Boston. The next meeting will be held in Rochester, N. Y.

INSTRUCTION IN TELEPHONE ENGINEERING.

The first instruction in telephone engineering was given in 1877 by Professor Alexander G. Bell and associates, according to G. S. Macomber in the *Sibley Journal of Engineering*. General lectures were given in many large cities in order to rapidly educate the public in the use of the telephone. Detailed instructions of an elementary engineering nature were given to those agents and assistants who were to direct the installation of the telephone instruments and lines in their corresponding section of the country. Before that time each person obtained knowledge about the telephone by investigating for himself. At this time, in order to assist the newly formed company in the exploitation of their apparatus, data of all kinds pertaining to the installation and use of the telephone were collected and disseminated. For a short time keen competition brought about similar bureaus for the collection and dissemination of telephonic information, but this died out in the course of a few years and the Bell companies became the sole custodians of the knowledge of practical construction and operation of the telephone. During the period from 1877 to 1893 modern telephone engineering began, and when the fundamental patents expired in 1893 there was a great rush into the telephone manufacturing and operating fields. This created a demand for men who knew about practical telephone work, both from the so called 'Independent" and the "Bell" companies, the latter needing new men to take the places left vacant by older men who had joined the independent ranks. Betwen 1893 and 1898 many telephone, operating and manufacturing companies went through the process of re-organization in which an engineering department was formed. As a result, the duties of the telephone engineer increased considerably. Since the number of men who had a practical knowledge of the subject was very limted, the field offered a fine opportunity for technical graduates, and many of them took up this work. The number of men to take up this branch of engineering work increased so rapidly that the professors concerned began to consider the advisability of special instruction in telephony.

A year ago an inquiry was made among some Cornell graduates now in the telephone field in regard to their ideas of the proper kind of instruction in telephony for engineering students. Among other suggestions an invitation was received, through the influence of Mr. N. M. MacLeod, '07, from Mr. F. A. La Roche, Division Plant Superintendent of the Philadelphia Bell Telephone Company, to visit and inspect their school for the instruction of employees in their maintainance and installation departments. The invitation was acepted and two days pleasurably and profitably spent in the inspection of this interesting school where, through the kindness of Mr. La Roche every facility to make a complete study of the details was offered. The following is an extract from a report giving the results of this study.

By way of introduction it may be said that the Bell Telephone Company of Philadelphia, established their school three years ago as the result of a sympathetic strike of their construction men. As the strike developed suddenly it became necessary to teach new men how to do the work left by the strikers. Young men were secured and given lessons in line construction, cable splicing, etc., and then sent out to make repairs. Within one week from the beginning of the strike the telephone company was able to take care of its work, and after a short time the strike broke up. Before the temporary school thus hastily established was closed it became evident that it would pay to extend the instruction and increase the facilities. This was done; and now atfer three years' trial it is considered a very profitable investment for the company.

There are at present two schools, one for installers, and one for maintenance men. The work of each is the same in general but differs in its details. The men who enter these schools are from the working force of the company and are under regular pay just as if they were doing the work of their respective departments. In the aggregate they devote six weeks, more or less, to the school work. Many of the men who take this work have never seen a book on algebra or geometry, and

others do not have a knowledge of fractions or proportion. It is therefore necessary to give a drill in elementary mathematics to enable the student to solve the most elementary elctrical problems.

Primarily the object of the school is to make the men more valuable to the company and accordingly the work is so conducted as to produce results as rapidly as possible. Although a part of the instruction given would be of value to the students in understanding other branches of telephone work, essentially it is directed toward maintenance and installation. The instruction is not intended to cover the telephone field broadly, but goes into every detail that is necessary to enable the men to locate the cause of, and to repair, with maximum speed and a minimum injury to the apparatus, troubles which develop in the particular types of apparatus used.

The physical equipment which is used by this company is limited strictly to apparatus of certain types that is manufactured by the Western Electric Company. There is no magnetic telephone apparatus in the school, this type not being used in the Philadelphia District. The maintenance school equipment consists of a standard type power switchboard, duplicate ringing machines, duplicate pole changers, storage batteries, mercury arc charging set, main and intermediate distributing frames, relay rack, fuse panel, resistance frame, one three position section of a No. 1 Western Electric Telephone switchboard, there being one "A" position, one "B" position, and one "Trouble" position, each with corresponding shelf equipment. The face equipment of this board is about 500 multiple jacks arranged specially for instruction purposes; one standard No. 9 board having three positions each equipped with ten cord circuits; one "P. B. X." (Private Branch Exchange) switchboard with a capacity of 25 lines; one Wire Chief's "Desk," equipped with three plugging up lines with visual signals, three cord circuits, one test circuit, two order circuits, two incoming trunks, and two outgoing trunks. In addition to this regularly formed equipment there are about twenty sets of apparatus wired to special terminals and mounted on box frames for detailed circuit study. Besides the above apparatus in the maintenance school there is a somewhat similar equipment for the installers' school, and also many small ingenious pieces of apparatus too numerous to mention here in detail. The equipment in these schools has been built up gradually at an aggregate cost of approximately five thousand dollars.

The result of a study of the above conditions may be summarized as follows: With a very complete equipment, first class instructors, and the equivalent of 100 laboratory periods of three hours each, the result produced in the above schools is a highly specialized training giving the student a microscopic view of a very small part of the modern telephone system. For the Plant Department of the telephone company this result is very satisfactory, but for a University course it would be very decidedly out of place. University students with the same physical equipment and amount of time would get much more out of the work. However, after considering the way the work should be modified to meet the needs of a University course it becomes evident that any system of elaborate telephone experiments, would be a serious waste of time for University students.

The methods of, and the equipment for, telephonic instruction at Drexel Institute were also studied. There the work is taken up from the standpoint of the trade school. It may be described as slightly less highly specialized than the above, yet still not treated broadly. Later study of the methods of telephonic instruction at other schools and some colleges lead to the conclusion that there is a strong tendency in the same direction, namely, toward too much specialization.

During the past few years there has been considerable discussion among college professors and also among practicing engineers as to the education of electrical engineering students. Papers on this subject have been presented and discussed at the meetings of the American Institute of Electrical Engineers, and the Society for the Promotion of Engineering Education. A great variety of opinion was expressed at these meetings, but there is a decided leaning toward the belief that the University course could be less specialized, that it should train the students to look at things broadly and that the kind of knowledge given should be such as would apply to all kinds of engineering. Some engineers think that only a degree of Bachelor of Engineering should be given for undergraduate study. The following quotations are from the discussion of papers presented at the June, '07, meeting of the A. I. E. E., they express the growing opinion of practicing engineers regarding engineering education. Mr. L. D. Nordstrum says, "It is my opinion that a man has never finished his education; his entire life is that of a student. His University years are merely his starting or foundation years." Mr. J. J. Carty, who is probably the most noted telephone engineer to-day, speaking in regards to the technical graduates who have entered the telephone field under his direction, says, "As a rule men are well trained technically but are often very defective in respect to that broad and liberal training which should underly the technical education of every profesisonal man."

The above statements were intended to apply to the complete four year electrical engineering course, but it is believed that they can be applied to the short specialized telephone course. The following requirements of a course of instruction for telephone engineers are suggested. The general course for telephone engineers should not be too highly specialized, but of a very broad and general character, including among the general engineering subjects such allied subjects as patent law, economics, architecture. The special telephone instruction should be given in a course which—must be short, in order not to take too much time away from the general engineering studies; should not aim to teach that which can easily be learned in the first few weeks or months of practical work; should include statements giving practical advice as to what non-electrical parts of his technical course will probably be found of greatest importance in practical work of the telephone engineer. The keynote of the course should be an accurate resume of the fundamental principles involved in the operation of telephonic apparatus, and in the organization and management of the telephone system as a whole. This should be so thoroughly treated that the student understands fully, then he will not soon forget. To accomplish this a few illustrations from practice should be carefully studied. The subject matter should be so presented as to develop reasoning power and interpretation of engineering data.

With the above facts in view instruction will be given at Sibley College in telephone engineering during the coming term through a small number of senior students. The work will consist mainly of lectures, sometimes illustrated with lantern views, sometimes experimental and with occasional inspections of practical telephone systems. A trip to one of the larger cities may be undertaken to impress the relative proportions of the telephone system. Telephone laboratory work sufficient to give the student a general idea of the method of operating a telephone switch-board and the essential features of a common switchboard circuit, has been arranged in the regular electrical laboratory course for all electrical engineers. Therefore this will not be taken up in the special course for telephone engineers. They will devote sometime to a more detailed study of single pieces of apparatus in order to gain a thorough knowledge of principles of operation, limitations, etc. In addition some special engineering research will be offered to those who are prepared to do such work efficiently.

It is hoped and believed that this system of instruction will give students a broader conception of telephone engineering and a more thorough knowledge of the fundamentals.

The remains of the heroic telephone operator, Mrs. S. J. Rook, former telephone operator at Folsom, N. M., have been found deeply buried sixteen miles below Folsom. During the great flood at Folsom last August, Mrs. Rook, who realized the danger, remained at her post, warning the farmers of the valley by telephone until the telephone station was overwhelmed by the waters. Her action saved hundreds of lives.

THE ELECTRIC CLUB OF CALIFORNIA.

The Electric Club of California held the most successful meeting of its existence on February 4th at the Hotel Argonaut, San Francisco, 71 members being present.

The meeting, as usual, took the form of a luncheon, followed by a few informal speeches and an unusually interesting article by E. S. Sherwood on the subject of incandescent lamps.

The large number present and the enthusiasm shown seemed to justify the change made in the meeting day from Saturday to Thursday.

E. M. Scribner, Jovian statesman for California, among other speakers, talked upon the subject of Jovianism and its objects, and called attention to the Rejuvenation which will be held on the night of February 13th, urging every member of the Electrical Club not now a member of the Jovian Order to be present.

Next to the luncheon itself, the important feature of the meeting was the very instructive article on tungsten lamps by E. S. Sherwood, lamp expert for the General Electric Company. The article was illustrated by numerous lantern slides, Mr. Sherwood being assisted in the lantern work by C. C. Davis and F. D. Fagan.

H. F. Frosch, President, Electric Club of California.

At the conclusion of the meeting, President H. F. Frosch called attention to the fact that the present officers and directors of the club have been serving temporarily during the period of organization, and suggested the advisabiilty of placing the club on a permanent basis by the election of permanent officers.

In recognition of the past work of the temporary board and the success they have achieved in bringing the club to its present prosperous condition, it was moved by John R. Cole that the temporary officers be made permanent, which was unanimously carried.

The permanent organization as now made up is as follows: President, H. F. Frosch; Vice-President, A. E. Rowe; Secretary, R. D. Holabird; Treasurer, E. D. Poss; House Committee, F. H. Poss; Directors—H. F. Frosch, A. E. Rowe, R. D. Holabird, E. D. Poss, Frederick S. Mills, R. L. Wolden.

Steam turbines were mounted on rubber foundations to obviate any possibility of vibration in a recent installation at St. Pancras borough, England. The 2,000 k. w. steam turbine has been bolted to a reinforced concrete slab which rests on a series of small rubber stools, the stools themselves resting on an ordinary concrete foundation.

THE SONS OF JOVE.

THE Sons of Jove, that band of electrical men with an object most serious and worthy, but with no particular home, will hold its first Rejuvenation of the year on Saturday evening, February 13th, at the Hotel Argonaut, San Francisco, when it is expected that a large number of new members will be initiated.

The ceremony of Rejuvenation will take place at 6 o'clock and will be followed at 8 o'clock by a German supper, which will include everything in the eating and drinking line for which the land of the Kaiser is famous. The supper is in charge of H. F. Frosch, who has had a broad experience in handling affairs of this kind, and his name is a guarantee of its worth—particularly as it is to be a German supper.

MENU.

Caviar on Toast.
Marinette Herring.
Sardelles.
Radishes. *Olives.*
Frankfurters with Sauerkraut.
Kartoffel Salad.
Schweitzer Kase.
Beer.

The preliminary work on organization of the order has been in charge of T. E. Bibbins, first Statesman for California. E. M. Scribner, with the beginning of this year, accepted the appointment of Statesman as his successor, the work of Mr. Bibbins being recognized by his appointment as a member of the Seventh Jovian Congress. This Rejuvenation will therefore be the first one under the direction of the new Statesman.

With the exception of a short address by Mr. Scribner, incoming Statesman, and a response by Mr. Bibbins, retiring Statesman, there will be no speeches. In lieu of speeches the entertainment committee, made up of R. L. Phelps, F. H. Poss, and H. F. Frosch, has prepared a very interesting musical entertainment; this will include a number of popular songs and the famous Jovian Choir will render the Jovian Hymn.

The Jovians have amongst their number sufficient vaudeville talent to supply an evening's entertainment, and under the direction of the above committee, this part of the program will undoubtedly be a success. Mr. Frosch, who uses the Steinway exclusively, will preside at the piano.

The various committees have worked hard to make the affair a memorable one and everyone is expected to have a busy evening except the policeman on the corner.

Zinc white from ore by the electric furnace is being successfully made at the Arudy Works in France. A perfectly white zinc oxide is obtained directly from crude low grade ore by electrically smelting it with lime and carbon. Electric power cost $13 per h. p. year and carbon electrodes $4.60 per pound. A 100 h. p. furnace produces 30 lbs. hourly with a current consumption of 68 kw.-hours from a 46% ore.

Chicago Telephone Company has 180,000 telephones connected, being the second largest telephone exchange in the world. The growth last year amounted to 35,000 instruments, which was equal to the entire growth of the first twenty-three years of the company's existence. The average number of calls per subscriber is twenty-two calls per line per day. There are thirty-five exchange buildings. The underground conduit amounts to 435 miles, there are 377,000 miles of underground wire, and the overhead wire foots up to 65,000 miles. The company employs about 5600 operators.

CURRENT COMMENT

Electric power generated by Niagara Falls is now being distributed at a distance of 125 miles from its source, and the Canadian Government is planning to more than double this distance.

The largest advertising sign in the world, it is claimed, is at Jersey City, N. J. It is 200 x 50 feet with letters 20 feet high and 3,000 incandescent lamps are used in its construction.

The first French automatic telephone system has recently been installed at Lyons. The initial apparatus has a capacity of 200 subscribers, but will be enlarged if the system proves satisfactory.

Automatic gas buoys have been placed in the harbor of Colon and Cristobel to mark the channel of the Panama Canal as it has been dredged from deep water to the shores. They are charged with calcium carbide and remain lighted six months without recharging.

Piles preserved by water, after an interval of sixty years, have been encountered by the dredge working from the old French canal into the prism of the new Panama Canal at the north end of the Gatun lock site. In making a cut through the old line of the Panama Railroad it was found that piles had been completely rotted down to sea level, but below were as sound as when they had first been driven.

Contracts for wireless apparatus were recently closed by the Oceanic Steamship Company with the United Wireless Telegraph Company for the installation of wireless plants on the steamers Mariposa and Alameda. The installation will be made as soon as the liners return to San Francisco. The Alameda will be the first to be fitted for this work, arrangements now being made to equip her upon her arrival during the coming week. Work on the Mariposa will begin in about a month. This system will enable the steamers to keep in touch with both this Coast and Hawaii nearly every day when they are at sea.

Bare aluminum wire may safely be used in coils without any insulation except between successive layers, owing to the existence of a film of oxide on the surface of the aluminum. The film in its natural state, says the Scientific American, will resist 0.5 volt; but by exposing it to the air at a temperature of about 100 degrees C. it is possible to get rid of the hydrates contained in the film, and thus increase its resistance so that it will withstand a high voltage. The insulation between the layers of the coil should be non-hydroscopic, and the coils should be covered with insulating paint to prevent moisture from entering.

An arrest by wireless telegraph was accomplished recently by the police department of Oakland, California. J. J. Pember Jr. was arrested on a charge of embezzlement preferred by Sheriff J. W. Farrell of Eureka. Pember had left there several days previous. As the wires of the Western Union were down between San Francisco and Eureka, the Sheriff's message was filed with the Government wireless station there, received at the Mare Island station, and forwarded to Oakland. The arrest was made under the direction of Captain of Detectives Petersen, who informed Sheriff Farrell by wireless that his man was in custody.

Telephonic communication between mounted operators has been accomplished by Lieutenant A. C. Knockles of the United States Army, who has devised an ingenious arrangement whereby the horse is made a part of an electrical circuit. By this device the mounted operator is able to transmit messages to his base whenever necessary without dismounting, and is accomplished by placing a small piece of copper (properly connected to the telegraph or telephone instrument) against the animal's body, thus completing a ground connection through the horse's hoofs. The tests were made over all kinds of ground, and conversation is said to have been carried on between two operators five miles apart.

An interchangeable coupon book has been designed by Mr. J. B. Hoge, of Cleveland, Ohio, the well known independent telephone manager, for the use of the long distance telephone companies of the country, patterned to some extent after the books used by the electric railways which are members of the Central Electric Railway Mileage Bureau. The coupons are for five cents each, and as many may be taken out as are required to pay for a message at the office of any of the companies that enter into the arrangements. A clearing office will be established at Cleveland, and all coupons will be sent there, where settlements with the companies will be made. It is understood that all the independent long distance companies will become members of this bureau. In fact, many of them have been working for some time to secure a uniform plan of some kind along these lines. The books will insure a reduction in the rates, because of the fact that the purchaser pays in advance for many calls. The companies can thus afford to do this.

Telephone politeness in England is defined in a recent circular of the British postoffice. It says: "In order that abrupt and uncouth expressions may be avoided in the telephone service, telephonists engaged at trunk exchanges are in the future to make use of the following expressions in connection with their work, and the supervising offices should impress upon the staff generally the necessity of adhering to the authorized form of words." Entering into details this official guide lays stress upon the advisability of using the word "please" where it can conveniently be introduced. "The telephonist answering a call should announce her presence by saying 'Trunk number, please?' Failing to hear what the subscriber says, she should say: "What is your number, please?" and so on. "When a subscriber's attention has been obtained for the trunk call the telephonist should say: 'What is your number, please?' If the subscriber should be kept waiting for more than the regulation time the telephonist should add: 'Sorry to have kept you waiting.'"

The interchange of long-distance business between the Bell companies and the independents wherever it is necessary to do so in order to get a message through to destination, is the subject of a bill Representative A. B. Canfield has introduced in the Ohio House of Representatives. It provides for forfeiture of the charter of any company that refuses to connect its lines with those of any other company whenever it is necessary to transmit a message in that way. In the past efforts have been made to secure such a law, but not enough members could see the necessity of putting requirements upon the companies that might destroy competition and make it impossible for the further development of territory by the independents. This bill also contains a provision limiting the rate that local exchanges shall charge to $24 a year in cities of 100,000 population or less, with an increase of $6 for each 100,000. For long-distance business the rate is to be not more than half a cent a mile for five minutes' conversation. The difference in the length of conversation is the greatest change over present rates for long distance service.

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High Telephone Rates in Large Cities

Why is it that I have to pay more for a telephone in a large city than in a small town? Why has the rate for telephone service in this community been doubled during the past ten years? These and many other similiar questions meet the bill collector on every trip. He often does not know why, and must refer the subscriber to the office, and yet if he did but know it, the answer is as simple as it is short—it costs the company more.

The telephone business differs from almost every other in that its cost does not decrease as its quantity increases. There is no wholesale rate in telephone service. The cost of installation and operation becomes greater as the number of subscribers increases, and consequently in a growing town telephone service costs more as time goes on, and in a great city the cost is necessarily many times that of a small suburb.

There are several factors which combine to make this increased cost. Some, such as real estate and high wages are common to all industries in large cities, others are peculiar to the telephone business. A small town has one central office with few operators and simple apparatus and all wires are carried on poles. A large city requires several central offices and more elaborate apparatus so that many subscribers may be quickly connected; much of the wiring is underground, thus increasing the construction cost materially.

This matter of increased cost of service in proportion to the growth of an exchange was shown in the report of the committee which recently investigated the renewal of the franchise of the Chicago Telephone Company in which it is stated:

"The subdivision of a city into exchange districts, with an exchange in each district, necessitates a complete system of intercommunication between each such district and all of the other districts. The complexity of switchboard wiring and the multiplicity of trunking facilities form very expensive items of plant installation. It also necessitates the handling of a very large percentage of messages twice. In a large city a very small proportion of calls are completed within a single exchange. It is usually conceded that about eighty per cent of such calls are required to pass through a second exchange. It is thus plain to see how both the investment and the operating cost are accordingly increased.

"There are additional causes for the increased cost of service, such as higher wages and shorter hours; destruction of underground cables by the interference of foreign electrical currents; higher rates of taxes and insurance; probable higher rates of compensation, and some additional investment for the benefit of the city, in providing space on poles, and ducts and cables, for the city's use."

So it is seen that it is just for the city user to pay more because it costs more. Furthermore he gets more, for he is able to call thousands whereas the subscriber in a small town can call but hundreds. Until some radical change is made in the present methods of telephonic communication there is but little likelihood that telephone rates can be made smaller. The stockholder is entitled to a fair return on his investment, and as this investment increases the bills of the consumers grow greater.

PERSONALS.

Geo. H. Scoville, resident engineer for the Dean Electric Company, is away from San Francisco on a brief trip to Southern Oregon.

B. C. Van Emon, of the Van Emon Elevator Company, San Francisco, returned this week from an extended trip through the Northwest.

W. A. Purcell has been appointed San Francisco representative of I. P. Frink, 551 Pearl street, New York City, manufacturers of reflectors.

R. L. Phelps, of the San Francisco office of the Safety Insulated Wire and Cable Company, is in the Northwest and will return to San Francisco about February 15th.

Herbert D. Crouch, sales manager of the Northern Electrical Manufacturing Company, Montreal, spent the past week in San Francisco and left for Vancouver on Monday night.

Mr. F. H. Poss, of the San Francisco office of the Holophane Company and the Benjamin Electric Manufacturing Company, returned on February 6th from a six weeks' trip to the Hawaiian Islands.

J. H. MacNichol resigned as manager of the Pacific Telephone and Telegraph Company's office at Colfax, Wash., and has been succeeded by H. W. Schilling, formerly employed in the Spokane office.

J. E. Way, sales manager for the R. Thomas & Sons Company, porcelain manufacturers of East Liverpool and Lisbon, Ohio, has spent some time in Seattle and is due in San Francisco the latter part of this week.

George C. Heckman, formerly with the General Electric Company, in charge of power and equipment at the Fort Wayne Lamp Works, is now manager of the San Luis Gas & Electric Company, San Luis Obispo, Cal.

J. E. Wickstrom, of the Seattle-Tacoma Power Company, Seattle, is at Everett, Wash., as general foreman in charge of the sub-station, operation and construction, and the transmission line from Everett to Snoqualmie Falls.

Louis F. Leurey, formerly with Sanderson and Porter, on the Nine Mile Bridge development in Spokane, Wash., is now engaged in electrical construction work for the Union Construction Company on the Stanislaus electric power development in Calaveras County, Cal.

Mr. W. I. Hess is now in charge of the Dale Company, fixture manufacturers of New York, as manager, succeeding Mr. H. S. Salt, who severed his connection with that company on January 1st to enter business at New York as manufacturers' representative.

E. H. Cleveland, formerly employed by the plant department of the Pacific Telephone and Telegraph Company in Oakland, has been promoted to the position of manager of the company's exchange at Watsonville, succeeding Harry Westbrook, resigned.

A. N. Palmer, of the Phillips Insulated Wire Company, Pawtucket, is in San Francisco. He is making his annual trip to the Coast and reached San Francisco last Monday. He will spend the balance of the week in San Francisco, going from there to Los Angeles.

Mr. J. R. Mitchell, Secretary of the Doerr-Mitchell Electric Company, of Spokane, spent the early part of this week in San Francisco. Mr. Mitchell was one of a party of Spokane commercial men who are making a trip of the Pacific Coast and who were entertained while in San Francisco by the Chamber of Commerce of both San Francisco and Oakland.

A. C. Downing, Pacific Coast sales engineer for the Studebaker Automobile Company, has returned to San Francisco after a five months' trip throughout the Western States.

P. H. Coolidge, manager of the Western Electric Company, San Francisco, has returned from an Eastern trip, during which he participated in the sales conference of his company at Chicago, and later made an Eastern trip which included New York and Boston.

Theodore G. Seixas has been elected vice-president of the Pacific Traction Company, with offices at Tacoma, Wash. Mr. Seixas is to have charge and reorganize the several companies controlled by the eastern interests he represents, including water powers in the State of Washington.

C. H. Johnston, manager of the pole department of the Western Electric Company, on the Pacific Coast, has been in Los Angeles during the past week. In addition to several days in Los Angeles, he spent three days and three nights on the return trip, the delay being due to the washouts.

Harvey Hubbell, of Harvey Hubbell, Inc., and W. C. Bryant, of the Bryant Electric Company, Bridgeport, Conn., accompanied by Mrs. Hubbell and Mrs. Bryant, have planned a Pacific Coast trip, combining business and pleasure, for the latter end of February. Mr. Bryant has made frequent trips to this territory in the past but it will be the initial trip for Mr. Hubbell and a strong effort will be made by his Pacific Coast friends to sustain the well earned reputation of the Pacific Coast for hospitality.

TRADE CATALOGUES.

The Kellogg Switchboard and Supply Co. will send to those interested in construction and line material, etc., their revised price list recently issued, which is complete, covering this entire line. If desired, their bulletin No. 17, description of line material and supplies will be forwarded with the price list.

An attractive little booklet, the front cover illustrating the factory and cut to the shape of the building, containing numerous views and descriptive matter, of some recent switchboard installations, has recently been issued by the Kellogg Switchboard and Supply Co., Chicago. The halftones show interior views of exchanges, front and rear illustrations of switchboards, distributing frames, relay racks, power equipment, etc. These exchanges are of the latest type.

A bulletin, No. 40, describing their new pole changer, has recently been issued by the Kellogg Switchboard and Supply Co., and will be sent on request to those interested. It is well illustrated with different views of the apparatus, and descriptive matter that states what the pole changer will do and its efficiency, in a conservative way that can be depended upon. Anyone contemplating the purchase of such an instrument will be interested in this bulletin, and the company's engineering department will be glad to give any further information needed.

The Harvard Electric Company, 66 W. Van Buren street, Chicago, and 136 Liberty street, New York City, have issued a new catalogue known as No. 17, which is descriptive of a part of the many electrical necessities made by them. This catalogue is the fore-runner of a complete new series of printed matter illustrating Harvard Dependable electrical necessities. The No. 17 catalogue describes Harvard Patent Steel Brackets, Harvard Beveled Edge Self Welding Wire Joints, the Improved Harvard Sectional Switch Boxes, etc., etc. A copy of this catalogue will be mailed to any one interested, upon request.

TRADE NOTES.

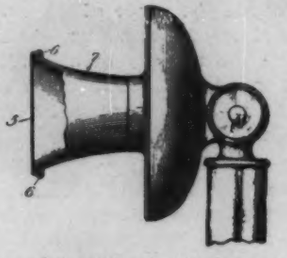
The Pacific Electric and Manufacturing Company have moved their offices from 701 Atlas Building to 80 Tehama street, San Francisco, the expansion of their business making larger quarters necessary.

PATENTS

908,490. Telephone Attachment. Newell B. Parsons and Albert Beutler, Chicago, Ill., assignors to Belden Manufacturing Company, Chicago, Ill. In an attachment for telephones, a metal base; wings formed from and integral with said base; a pad-retaining clip pivoted on said wings; clamping jaws

slidably attached to said metal base; and a rib stamped in said metal base, constituting at the same time a pencil groove on the upper surface of said base and a projecting rib parallel with one of the edges of said base on the underside of said base.

910,383. Sanitary Shield for Telephones. Owen H. Hudgen, Los Angeles, Cal. A telephone transmitter shield, comprising a circular diaphragm of relatively thin elastic material and of a smaller diameter than the telephone mouthpiece, said diaphragm having formed integrally therewith on

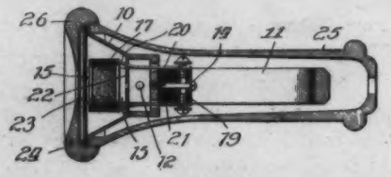


its periphery an annular rib of relatively heavy elastic material, said rib being substantially circular in cross-section and projecting equally beyond the plane of each face of the diaphragm, whereby either side may be utilized as an outer face.

910,189. Telephone Attachment. Joseph C. Fox, Seattle, Wash. A device of the type set forth comprising a support composed of two sections slidable one on the other, guides on the respective sections of said support, the guides of one

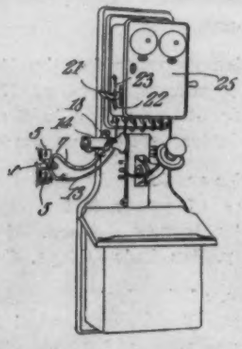
section embracing the other section, each of said sections being formed with notches adjacent the guides thereof, and means on said support for adjustably holding the receiver of a telephone.

910,603. Telephone Receiver. Alfred Stromberg, Chicago, Ill. In a telephone receiver, a diaphragm with a reinforced



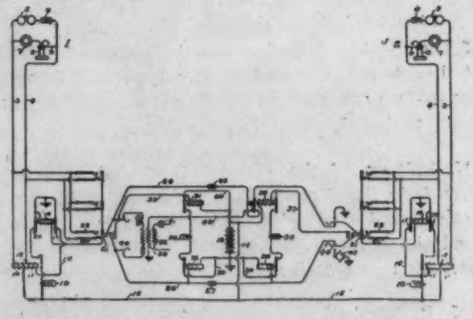
edge, said reinforced edge consisting of a ring of metal spun upon the diaphragm and forming a reinforcing ring upon each side of the diaphragm.

910,918. Support for Telephone Receivers. Robert S. Griffith, Berkeley, Cal. In a device of the class described, a U shaped bracket having flat, horizontally disposed arms, the said arms near their terminals oppositely bent into a vertical plane and adapted to receive support engaging means, the outer end of the bracket having a vertically incised slot; oppositely dis-



posed shoulders projecting inward from the edges of the slot; a curved tube loosely mounted in the slot to the rear of the shoulders and normally fulcrumed upon the said shoulders; and means for supporting a telephone receiver, mounted upon the curved tube.

908,926. Three-Wire Telephone System. Charles S. Winston, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill. In a telephone system, the combination with a telephone line, of a cord circuit for making connection therewith for conversation, a third conductor at the central office isolated from the talking circuit, a cut-off relay



and a supervisory relay in said third conductor, a line relay permanently connected with the line, a source of current, a second supervisory relay connected between said source and the sleeve strand of the cord circuit, and a supervisory signal having its circuit jointly controlled by the contacts of said supervisory relays.

INDUSTRIAL

CO-OPERATION.

One of the principal sources of strength in the old established telephone monopoly is the fact that their close organization enables the various companies to interchange valuable ideas. In line construction, in the design of telephone apparatus, and in the operation of exchanges, each of their managers has the experience of many of the others at his disposal.

As a result of this feature, Bell construction has become somewhat standardized, and their exchanges and lines are more or less uniform throughout the country. While this effects considerable economy, it has offered the Independents an enlarged opportunity for successful competition.

For several years after the Independent movement sprang into existence, the various companies were absolutely unassociated. Each manager operated his system without regard to the experience or opinion of any of his associates. While this became the source of serious trouble in handling toll business, it served the remarkable purpose of developing a good many original and valuable ideas. It is interesting to note in this connection, that the Independent manufacturers had to meet all of the varying requirements of a good many different operators.

It is certainly advisable to retain the advantages of this individuality in the further perfection of Independent telephone designs. However, some means of interchanging operating ideas have long been desired and efforts have been made in this direction through the medium of Independent associations, and various other organizations. However, the latest successful effort is being made by an Independent manufacturer.

Manufacturers' representatives and engineers are certainly very familiar with the detailed requirements of the operating field. Their business life depends on carefully meeting each operating demand. The Dean Electric Company of Elyria, Ohio, one of the largest Independent manufacturers, has been making an effort to assist the Independent movement in this way.

All Dean salesmen assemble at the factory about the first of each year, for a week of telephone instruction. This schooling includes, primarily, a careful comparison of operating methods throughout the United States and, since representatives are present from nearly every State in the Union, many very interesting features are discussed.

The Pacific organization, which operates under the direction of Resident Engineer George A. Scoville, who is located at the Dean Branch House in San Francisco, was unable to attend this year's meeting. The unusually large business in this territory, and the many pending contracts made it impossible for Mr. Scoville to go East alone for even the few days required.

A few manufacturers follow the plan of occasionally calling in their salesmen, simply for the purpose of discussing selling methods. The Dean idea, however, is unique in that it is based primarily on an effort to assist the Dean customer by so educating the salesman as to enable him to be of practical operating assistance. This is a more substantial basis to work on than merely to get together to talk over the Dean Company's own particular ambitions.

The new medium of transmitting these several items of operating intelligence, is the well-informed Independent salesman.

Eastern Sales Staff of the DEAN ELECTRIC Company—Annual Sales Meeting, 1909.

THE ELECTRICAL VEHICLE BUSINESS.

Meeting to Be Held at San Francisco.

Meetings of those interested in the development of the electrical vehicle business will be held under the auspices of the Electric Storage Battery Company, manufacturers of the Exide battery, at the Hotel St. Francis, San Francisco, on February 19th and 20th. Papers will be presented on batteries, vehicles, motors, arc rectifiers, and other subjects, the complete program to be issued later.

The reading of the papers will be followed by discussions in which all present will be invited to participate. It is expected that the discussions will bring out a fund of information valuable to all.

The opening session will begin at 10:30 o'clock Friday morning, February 19th.

The electric vehicle both for pleasure and business is no longer an experiment. The power companies furnishing electric power in the larger cities will undoubtedly appreciate the opportunity offered not only of increasing their output, but of improving their load factors by furnishing current for charging automobile batteries, and should be interested in a conference of this character. That the business will receive a stimulus by periodically bringing together those who will mutually profit by it is without question.

It is expected that representatives of manufacturers and vehicle distributors, and central power stations from Los Angeles, Portland and Seattle, will be present, and an invitation is cordially extended to those who are interested in the object for which the conference is called.

WHEELER CONDENSING APPARATUS ON THE COAST.

C. H. Wheeler Manufacturing Company of Philadelphia, have an office in the Monadnock Building, San Francisco, in charge of Mr. Frank R. Wheeler. This Company builds steam, electric and power driven pumps, both for pressure and vacuum; also surface, barometric and jet condensers, feed water heaters and water cooling towers.

In connection with the Palace Hotel power plant there is being installed Wheeler condensing and vacuum apparatus including a cooling tower and two ten foot fans. Complete apparatus has also been furnished the Pacific Fruit Express for stations at Colton, Las Vegas and Roseville, for the People's Water Co., in Oakland, and for the Golden State Portland Cement Co., at Oro Grande.

NEW OPERATOR'S RECEIVER.

Many receivers heretofore manufactured, have been found wanting in one respect or another. A good many troubles have arisen, among which, might be noted excessive weight and unsanitary head bands, which short circuit the receiver terminals when thrown back; fittings which are continually catching in the operator's hair; exposed metal parts improperly insulated from the circuit; no provision for attaching strain cord or protecting the conductors; trouble in removing and replacing cord tips; failure to securely fasten all parts to the shell; no provision for using standard cord tips; loss of magnetism; difficulty in remagnetizing, etc.

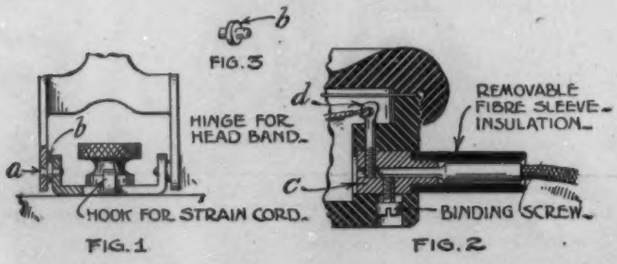
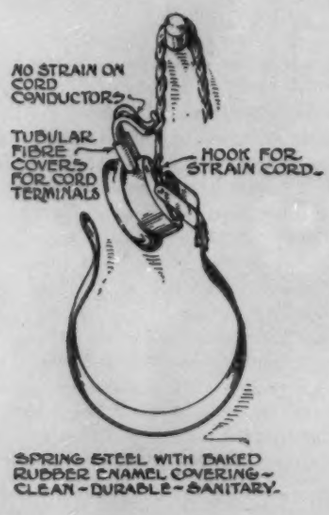


FIG. 1 FIG. 2

After carefully studying every pattern on the market and noting all of the objections that could possibly arise, the Dean Electric Company has perfected a new head set, which has lately been placed on the market. The weight has been cut down by omitting all unnecessary material. The new head band is both sanitary and serviceable. By properly comparing the magnets and windings, the efficiency has been brought up to a remarkably high point. Furthermore, the permanency of the magnets is assured by employing a special imported steel, the same as is used in standard precision volt meters and ammeters.


NO STRAIN ON CORD CONDUCTORS
TUBULAR FIBRE COVERS FOR CORD TERMINALS
HOOK FOR STRAIN CORD
SPRING STEEL WITH BAKED RUBBER ENAMEL COVERING ~ CLEAN ~ DURABLE ~ SANITARY.

The most permanent feature—the head band—is constructed from spring steel which is covered with a vulcanized rubber. This material gives a remarkably elastic and durable finish, and one which may be cleaned with a damp cloth. This feature obviates the great objection to the interchange of head gears among operators. As shown in Figs. 1 and 2, provision is made for attaching the head band to the receiver. Instead of using a plain or shouldered pin for a pivot, a special turned piece is made from solid stock as illustrated by *b*. One end of this pin is riveted into the band at *a*, while the other forms a pivot. When once assembled, this construction is permanent and the hinged portion securely holds the pin in place even when loosened through rough usage.

Another valuable feature is the cord binding post, which is designed to take a standard cord tip and keep all metal parts entering into the circuit, completely insulated. A fibre sleeve is threaded over the end of the binding post *c*, Fig. 2, so as to enclose the body of the cord tip and thoroughly insulate it as well as to keep it from becoming bent through rough handling. The binding screw can be reached from the outside of the receiver casing without removing the ear cap, and its head is set below the surface of the rubber a sufficient distance to prevent the operator's hand from coming in contact with the circuit.

Another detail which is appreciated by the exchange manager, is the hook which is formed in the back of the case for holding the strain cord. This permits the receiver to be hung up by the cord without damaging the terminal connections and does away with one of the largest items of cord maintenance.

The outer case is made very strong from hard rubber of heavy cross section, while the current carrying parts are insulated from the surface, so that it is impossible for the operator to receive electrical shocks.

Everything considered, this new receiver is a typical Dean product, made with a view of obtaining the highest efficiency and the reduction of the maintenance cost to the lowest limit.

ANOTHER EMERGENCY INSTALLATION.

An example of rapid telephone switchboard installation was again given by the Western Electric Company at Franklin, Pennsylvania, recently. A fire broke out in the building in which the exchange was located early in the morning of November 17th and in a few hours the city was without any convenient means of communication.

Before the fire had burned itself out an order was wired the Pittsburg house of the Western Electric Company to furnish as soon as possible the means by which Franklin might again have telephone service.

A number of emergency boards, which Western Electric houses always have on hand, were set up in the city in about forty-eight hours after the fire, which supplied the needs of subscribers until a new switchboard was put in service.

Renewing a telephone service in a little over forty-eight hours after a main exchange has been totally destroyed is quick work, particularly when the emergency boards have to be sent about 150 miles. But what is to be commended most is the fact that on the evening of the day the emergency boards were received from Pittsburg a car of switchboard material was received from the Western Electric manufacturing plant at Hawthorne, Illinois.

Mr. M. H. Buehler, general manager of the Central District Printing and Telegraph Company, expresses his appreciation of the speedy and efficient work in a letter to President H. B. Thayer of the Western Electric Company, which reads in part as follows:

"I beg to thank you for the very prompt and efficient aid rendered us in restoring service to our Franklin, Pennsylvania, subscribers, the credit of which is due largely to your efforts, and the prompt manner in which you looked after our needs."

The many Pacific Coast friends of E. L. Wayman, formerly manager of the California Electrical Works, San Francisco, will be glad to know that he is meeting with great success in his management of the Seamless Steel Bathtub Company, manufacturers of pressed steel bath tubs and other sanitary ware, at Detroit, Michigan. They announce a recent connection with Mr. Harman S. Salt, of 114 Liberty street, New York, under which Mr. Salt will have charge of their interests in the East. Mr. Salt was also connected with the California Electrical Works in years past.

CALIFORNIA OIL FIELDS.

Within the last year and a half four bulletins, descriptive of five of the California oil districts, have been issued by the United States Geological Survey. Work has been continuous in these fields, including that of the past summer, which is described in this newspaper report. The bulletins above mentioned are Bulletin No. 309, The Santa Clara Valley, Puente Hills, and Los Angeles Oil Districts, Southern California, by George H. Eldridge and Ralph Arnold; Bulletin No. 317, Preliminary Report on the Santa Maria Oil District, Santa Barbara County, California, by Ralph Arnold and Robert Anderson; Bulletin No. 321, Geology and Oil Resources of the Summerland District, Santa Barbara County, by Ralph Arnold, and Bulletin No. 322, Geology and Oil Resources of the Santa Maria District, Santa Barbara County, California, by Ralph Arnold and Robert Anderson.

These reports are issued in octavo form with paper cover; the text is devoted to more or less detailed descriptions of the geology of the areas under discussion, especially as it relates to the occurrence of the petroleum; descriptive details of the productive areas, such as lists of the oil companies operating, number of wells owned by each, the thickness of the various sands, depth of the wells, quality and quantity of the oil produced, and other useful data, including chemical analyses of the oils made by the survey and conclusions by the oil geologists concerning the areas in which the indications appear best for further development. Supplementing the text are geologic and land line maps of the districts, and, where the data have warranted it, maps showing the underground geology by means of contours; photographs illustrating certain striking features of the geology or development; and, in Bulletins 309, 321 and 322, plates illustrating the fossils characteristic of the various formations encountered in the region. By means of these fossils it is possible to identify the formations in adjacent regions where the geology has not been mapped.

During the summer 1907 the United States Geological Survey undertook the topographic mapping of the southwestern side of the San Joaquin Valley from the Coalinga District, in Fresno County, south to the Sunset District, in Kern County. This work was under the general direction of R. B. Marshall, Geographer, and parties in charge of E. P. Davis, George Davis, R. M. La Follette, J. E. Blackburn and J. W. Miller, were engaged in the work, which was completed in the early part of the present year. The map will be issued in two sections, one covering the territory from Coalinga to Dudley, Kings County, and the other embracing the remainder of the region south to the Sunset District. A few photolithographic advance sheets of both sections have been distributed at advantageous points, such as the postoffices and offices of the larger oil companies and ranches throughout the District, where they may be consulted by the public. On these maps the position and shape of the hills and valleys are shown by contour lines, each of which represents a certain elevation above sea level, and the streams, roads, houses, and section and county lines are shown by conventional signs. The contour interval is 100 feet and the scale of the map is approximately two miles to the inch.

Topographic mapping similar to that done in the region from Coalinga to Sunset is now being carried northward from Coalinga to connect with the areas shown on maps already issued covering the vicinity of San Francisco Bay. This new map will probably form the basis for geologic work similar in character to that done in the Coalinga-Sunset territory.

Simultaneously with the topographic mapping of the region from Coalinga southward to Dudley, geologic mapping and investigations of the oil resources of the same area were carried on in the summer of 1907, by Ralph Arnold and Robert Anderson. The results of their work have been embodied in two reports on the district. One entitled "A Preliminary Report on the Geology and Oil Resources of the Coalinga District, Fresno and Kings Counties, California," has been issued as Bulletin No. 357. It contains a condensed account of the geology and oil resources and is accompanied by black and white maps, one showing the surface geology of the whole region and the other the underground geology of the proved territory of the Coalinga field. A more extended account of the geology, illustrated by engraved maps, sections, photographs and plates of characteristic fossils, and accompanied by a table of over 50 analyses of the oils by Irving C. Allen, of the Geological Survey, will be issued later, also as a bulletin for free distribution. The work of Messrs. Arnold and Anderson has also been made the basis for the classification of the public lands in the Coalinga District as mineral or non mineral, reported to the General Land Office.

During the summer of 1908 a United States Geological Survey party, consisting of Ralph Arnold and H. R. Johnson, carried geologic investigations southward from Dudley to the Sunset oil district, the territory covered embracing the Devil's Den, Bitterwater, Temblor, McKittrick, Midway, Sunset, and Carrizo Plain districts. Reports similar to those relating to the Coalinga district will be prepared for this new region. The preliminary bulletin is expected to be ready for distribution by next spring.

Copies of Bulletins 321 and 357, and a list of the publications of the Survey may be obtained free by addressing a request to the Director, U. S. Geological Survey, Washington, D. C. Bulletins Nos. 309, 317, and 322 are now out of stock for free distribution, but may be obtained from the Superintendent of Public Documents, Washington, D. C., for 80c, 15c and 50c, respectively. Persons desiring copies of reports not yet issued will, on request, be placed on the mailing list for the bulletins.

WIRELESS OPERATOR STRUCK BY LIGHTNING.

Lightning is an infrequent phenomena on the Pacific Coast, but in the thunder storm which took place at 4:30 o'clock on the morning of February 7th, the equipment of the Massie Wireless Station near the Cliff House at San Francisco, was struck by a bolt which destroyed the equipment and seriously injured Wm. J. Smith, western manager for the company, who was acting as operator at the time.

While Smith was communicating with the Lurline, he was suddenly enveloped with a flash and was rendered unconscious, burning mementoes of the experience being imprinted on the flesh of his arm, chest and back.

In discussing his experience, Smith said:

"I was operating the company's station near the Cliff House about 4:30 o'clock this morning when I received the shock. The instant before I was in communication with the Lurline. The working conditions were splendid and I, with the receivers over my ears, had just sent a message to the vessel at sea when this great flash filled the station.

"Several times before in my experience I have received electrical shocks of greater or less severity, but never one that had the effect this lightning flash did. The scars that I have to show for my experience with lightning are peculiarly adapted to make me remember this adventure.

"It is rare that such an experience is had. In the West, along the coast, electrical storms are rare. We have not been prepared for them. In the East we have adequate apparatus to protect the appliances. The mast and the wires acted as a lightning rod and I got the full benefit. I am thankful that I was not killed."

The Heroult electric furnace has replaced crucible furnaces for the manufacture of tool steel at the Oboukhoff Steel Works near St. Petersburg. This is the first electric furnace to be installed in Russia.

A San Francisco wharf builder has discovered that teredoes may be driven from piling or other water timber by passing a weak electric current through the wood.

NEWS NOTES

TELEPHONE AND TELEGRAPH.

EXETER, CAL.—The Davis-Brown Company is building a new telegraph line in this city.

VANCOUVER, WASH.—The Minnehaha Co-operative Telephone Association has been granted a franchise.

CAMAS, WASH.—The city council has granted H. S. Parker a franchise for a telephone system for a period of 25 years.

ANACORTES, WASH.—The Farmers' Mutual Independent Telephone Company has been granted a franchise by the county.

ENAVILLE, IDAHO. — The North Idaho Telephone have ordered complete a switchboard and telephones for their Enaville plant

CHEHALIS, WASH.—Extensive improvements and extensions are to be made to the Chehalis and Boistfort Telephone Company.

STEVENS, WASH.—Franchise for Skamania Co-operative Telephone Association for telephone lines along country roads has been granted.

AUBURN, WASH.—The Home Telephone Company of Auburn expects to install a 100-line common-battery switchboard and telephones soon.

SOUTH BEND, WASH.—W. W. Connon of Centralia has purchased the telephone business of the city and has applied for a franchise at Raymond.

HOQUIAM, WASH.—The Pacific Telephone and Telegraph Company has begun the expenditure of $10,000 on the improvement of its lines in this city.

WENATCHEE, WASH.—Extensive improvements are planned by the Farmers' Telephone Company for the present year. Orders will be placed soon for a duplicate power plant.

NEVADA CITY, CAL.—The Pacific States Telephone and Telegraph Company is now securing rights of way for the building of a new line from Sacramento to Camptonville via this city.

SAN FRANCISCO, CAL.—O. W. Lillard, sales engineer of the Gould Storage Battery Company, with headquarters at the Monadnock Building, leaves this week for an extended trip through the Northwest.

EUREKA, CAL.—Superintendent Ed. McLaren, of the Pacific States Telephone and Telegraph Company, announces that the company is to begin building the long talked of road from Eureka to Crescent City.

The Eastern Oregon Telephone and Telegraph Company has been formed with a capital stock of $10,000, by J. R. Jenkins and others. It is the intention of the company to put a line from Burns to Lawen.

OAKLAND, CAL.—J. E. McGilvery, formerly representing the American Electric Telephone Company, with headquarters at Oakland, California, has been transferred to the Chicago house, with headquarters at Des Moines, Iowa.

LOS ANGELES, CAL.—A resolution has been passed ordering all telephone and electric wire poles removed and wires placed underground along the speedway from Hollister avenue to the southern city limits at Marine street.

MARSHFIELD, OREGON.—The switchboard and telephones or the Coos Bay Home Telephone Company of Marshfield arrives this week and the installation will be rushed so as to give service at the earliest possible time.

LOS ANGELES, CAL.—Secretary F. W. Eaton, of the Pacific Telephone and Telegraph Company, reports in his annual statement a revenue of $804,560.38 from local service $16,225.99 from long distance charges and $20,880 from real estate. The total expenses were $867,888.05. The company has $6,111,209.89 invested in its Los Angeles plant.

SAN FRANCISCO, CAL.—The Pacific Auxiliary Fire Alarm Company at its annual meeting re-elected the following directors: Louis Sloss, Geo. A. Moore, L. F. Monteagle, H. A. Hedger, M. H. Hecht, Alfred B. Ford and W. Hansen. The directors organized by re-electing Louis Sloss, president; Geo. A. Moore, vice-president, A. G. McFarland, Secretary.

PLYMOUTH, CAL.—The telephone exchange at Plymouth was recently destroyed by fire. Through the active and efficient management of Mr. E. H. Gardner, under whose control this office is conducted, toll connections were resumed within five hours after the fire and 72 subscribers were working on temporary boards at a new location the next day.

FARMINGTON, UTAH.—The equipment for the Davis County Telephone Company of Farmington arrived this week. Active installation will be begun at once. It is interesting to note that the equipment purchased for this company includes the very best common battery multiple type circuits and each town will be thoroughly equipped for the harmonic four and eight party service.

OAKLAND, CAL.—J. P. McCarty, inventor of a wireless telephone, has been making demonstrations in the Bacon Building of this city. He is reported to be able to transmit his voice through eight walls, a distance of 125 feet, and be heard distinctly. Although the instrument is crude Professor Elwell of Stanford University will, it is understood, give the instrument a thorough test.

LOS ANGELES, CAL.—President A. B. Cass, of the Home Telephone Company, reports that $745,189.66 was received during the year for rent and service in the city and $16,787.97 outside the city. Running expenses and depreciation amounted to $668,952.94. Expenses for construction and improvements were $305,821.75. The company has $6,185,045.02 invested in the city and $239,771.64 outside the city.

ANACORTES, WASH.—The installers from the Dean Electric Company have arrived in Anacortes and active work on the installation of the plant for the Farmer's Mutual Independent Telephone Company, Everett, Wash., will begin at once. The Anacortes board is of the full common battery multiple type and was shipped within thirty days from receiving telegram notifying the Dean Company to start work on the switchboard.

TURLOCK, CAL.—On November 1st the Turlock Home Telephone Company took over the Turlock exchange under a sublicense contract. A number of the business men of that town have taken hold of the exchange and in one month the new company has ordered twenty-five additional telephones, bringing the total number of subscribers in the exchange up to 305. The Turlock Home Company expects to spend approximately $1,500 in new construction and reconstruction in Turlock and will undoubtedly have a first-class plant on a splendid paying basis.

SAN FRANCISCO, CAL.—One of the first accidents of its kind ever known occurred at the Massie Wireless Company's station near the Cliff house during an electrical storm which visited this city early on the morning of February 7th, when William J. Smith, Western manager of the concern, who was operating the mechanism at the time was seriously burned and narrowly escaped being killed by an electric shock that struck the apparatus.

SAN FRANCISCO, CAL.—The Pacific Telephone Company in connection with the fixing of rates has submitted its annual statement to the board of supervisors. The local franchise of the company is valued at $450,000. The total value of its plant and franchise is estimated at $7,218,269.82. The total gross revenue last year was $2,119,416.12, made up as follows: Local receipts, $1,951,123.09; long distance, $63,033.03; real estate returns, $105,260. Its total expenses amounted to $1,602,000.

INCORPORATIONS.

SAN FRANCISCO, CAL.—The Canaros Oil Company has been incorporated here with a capital stock of $400,000 by F. N. Kimble and E. Hirschler.

SANTA ANA, CAL.—The Orange Gas Company has been incorporated here with a capital stock of $200,000 by D. L. Peters, M. L. Bellus, J. W. Kemp, E. B. Rhoades and J. S. Mitchell.

LOS ANGELES, CAL.—The Oliveta Water Company has been incorporated here with a capital stock of $6,000 by G. E. Daniel, Ferd Girker, E. O. Bailey, David Moyer and A. E. Dombrower.

SAN FRANCISCO, CAL.—The Empire Oil Company has been incorporated here with a capital stock of $200,000 by S. A. Gilbertson, H. A. Whitley, E. A. Guilbault, P. J. Muller and L. O. Cannon.

LOS ANGELES, CAL.—The Electric Dispatch Company has been incorporated here with a capital stock of $50,000 by G. C. Ward, H. E. Huntington, G. J. Kuhrts, S. M. Haskins and J. A. Gibson Jr.

SAN FRANCISCO, CAL.—The Black Mountain Land and Water Company has been incorporated here with a capital stock of $1,500,000 by Duncan Hayne, A. H. Redington, E. W. Howard, J. A. Hoey and A. D. Keyon.

TRANSMISSION.

EL CENTRO, CAL.—Work has commenced on the new power plant of the Holton Power Company at Holtville.

OAKLAND, CAL. — The California Electric Generating Company has applied for a building permit to construct a power station in the Sessions Basin in East Oakland. The building is to be made of steel and concrete and the estimated cost is $50,000.

CITY OF MEXICO, MEXICO.—A company is to be formed here with a capital stock of $10,000,000 by Paul Ginther, president; Juan Creel, treasurer and Lic. Joaquin Gortazar, secretary. The company proposes to build an electric light and power plant within a few miles of Santa Rosalia on Rio Conchas.

FRESNO, CAL.—The San Joaquin Light and Power Company has begun work on the extension of its power lines to eight valley towns, namely: Sanger, Clovis, Pollasky, Malaga, Sultana, Orosi, Parlier, Lemoore and probably Conejo. The power will be supplied from the generating plants of the power company on the San Joaquin River. General Manager Balch and a number of Eastern capitalists have visited Fresno and all have expressed their approval of the extension.

SACRAMENTO, CAL.—George P. Robinson, of Fair Oaks, has secured a bond on the property and stock of the North Fork Ditch Company for six months, the price being $350,000. Mr. Robinson is acting for Minnesota capitalists, who propose to build a road from Sacramento to Lake Tahoe, and it is believed that the water taken from the north fork of the American River will be used for power and irrigation purposes. Water rights have already been purchased on the American River in Placer county, near Auburn, and water for irrigation is being supplied to Fair Oaks and Orangevale in this county.

FINANCIAL.

LOS ANGELES, CAL.—The Pacific Light and Power Company shows receipts amounting to $1,780,101 and expenditures of $1,400,293. The value of its property and assets is given at $7,574,431.15.

SAUSALITO, CAL.—The $100,000 worth of bonds issued by Sausalito to defray the cost of installing a municipal water and distributing plant was awarded to G. G. Blymeyer & Co., of San Francisco.

LOS ANGELES, CAL.—The Domestic Gas Company, having 6,796 customers, reports receipts of $41,751, and expenditures of $44,207, and the value of its property $115,169. It manufactured 61,147,000 cubic feet of oil and water gas.

LOS ANGELES, CAL.—The Edison Electric Company shows receipts of $1,040,390.53, expenditures $646,912.21, and net earnings $393,478.32. It sold during the year current amounting to 36,946,805 kw. hours. It gives its property and assets at a value of $6,022,132.75. Its total receipts in the five counties in which it operates are shown to be $2,014,816.54, and its expenditures $1,208,273.85.

LOS ANGELES, CAL.—The Los Angeles Gas and Electric Company, with 55,366 customers, reports receipts of $1,881,855 and expenditures of $1,521,754, leaving a profit-and-loss balance of $360,100. During the year it manufactured 2,386,440,000 cubic feet of oil and water gas. The largest output in one day was 10,816,140 feet and the lowest 3,722,000 feet. The property and assets are valued at $6,110,308 in the city and in addition there is property in the county valued at $209,923.

OIL.

SANTA BARBARA, CAL.—The Union Oil Company and the Associated Oil Company suffered great losses during the past week by the breakage of their pipe lines across the Santa Maria and the Santa Ynez Rivers. The great torrents of flood waters that have come down these rivers are the cause of the loss.

McKITTRICK, CAL.—The Jewett Company, which has the Kern River lease, have found an interesting well. It is 1,070 feet in depth, has 175 feet of oil bearing formation, and the casing is landed in a bed of solid asphaltum. This is something new in McKittrick, and speculators are of the belief that still lower down there is another oil sand, for it is thought that the asphaltum came from seepage below and not from the oil above. The members of the company are deeply impressed and have undertaken the digging of a deep hole to test the levels below the asphaltum.

WATER.

BAKERSFIELD, CAL.—R. E. McCauley, of the National Supply Company is promoting a scheme whereby the entire West Side district of Kern county will have an abundant supply of pure water within a year. The supply will come from Ray's creek in Pine Mountain, forty miles almost due south of Midway, and will be piped by gravity and delivered to con-

sumers at about 4 cents a barrel. An eight inch pipe will be used at the intake and smaller sizes on the main. The pipe line will be capable of delivering 20,000 barrels a day, which is the minimum carried by Ray's Creek at any time in 30 years. Not only Midway, but also Sunset, McKittrick and Temblor will be supplied. If the demand is sufficient pipes can be laid into Devil's Den, where water is scarce, and into Kings county. The cost of the installation will be more than $350,000.

TRANSPORTATION.

PLACERVILLE, CAL.—W. P. Hyatt has filed notice of appropriation of 2,000 inches of water in the North Fork of the Cosumnes River for power purposes.

LOS ANGELES, CAL.—The trustees of Huntington Park have taken into consideration the offer of the American Steel Pipe Company to put in a water plant for $40,000 to supply a population of 6,000.

SAN FRANCISCO, CAL.—A satisfactory settlement has been made between the Government and the owners of the Truckee River General Electric Company regarding damage at Lake Tahoe, and no suits will be brought by the Government.

GALT, CAL.—The citizens of Woodbridge have offered the Central California Traction Company a free right of way to extend its electric line from Lodi to Woodbridge. Elbert Covell and Fred Parrott, representing the residents of Woodbridge, have consulted General Manager Sam B. McLenegen in regard to the extension and the company has declared its intention to begin work on this project soon.

BERKELEY, CAL.—The Oakland Traction Company has begun the construction of its new cross-town line on Ashby avenue running from the new Claremont Hotel at the head of Russel street west as far as San Pablo avenue, about two and a half miles. The work will be completed in about forty days. The new cross-town line on Dwight way, one-half mile further north, running from College avenue to Sixth street, is now in operation.

ALAMEDA, CAL.—Investigations of the local steam lines have been made during the past week by Electrical Engineers Moulthrop, Cahey and Clapp, representing the Southern Pacific Company, preliminary to the installing of the electric traction system which is to supplant the present steam system. The company proposes installing ornamental trolley poles in the center of the streets over which its trains will run. The city officials who accompanied the engineers were assured that the roads would be electrified and in operation within a year. All that is delaying the beginning of the work is the securing of a right of way for the connecting loop at the east end of the city.

ILLUMINATION.

LOS ANGELES, CAL.—Watts F. Helm, of Los Angeles, has asked for a franchise to erect a gas plant in this vicinity.

SANTA ANA, CAL.—The Orange County Gas Company has bought the gas works of W. L. Willets and will install a new gas holder with a capacity of 50,000 feet of gas.

LINDSAY, CAL.—President Chas. Burn, of the Lindsay Gas Company has returned after investigating a number of gas plants in the south and work will be soon under way for the erection of a gas plant at Lindsay.

LOS ANGELES, CAL.—Investigations of the tide lands in the vicinity of Long Beach are being made by Engineer F. G. Jones and several others for the Edison Electric Company, of Los Angeles. The company intends to erect a $1,000,000 gas plant in this vicinity to supply all cities of the south, except San Diego, with gas.

AMERICAN TELEPHONE AND TELEGRAPH SYSTEM CONNECTS WITH 1,000,000 NEW STATIONS DURING THE PAST TWO YEARS.

One of the most important features of telephone development in 1908 was the large increase in the number of independent companies with which connections were established by the Bell Company. During 1907 the Bell companies established toll and long distance connections with no less than 450,000 independent telephone stations throughout the country. The number taken over last year was practically as great.

As a result of the 1907 and 1908 development in this direction the American telephone and telegraph system now embraces a total of over 4,000,000 stations, of which 1,000,000 represent stations of small independent companies not owned outright but connected with the Bell lines. Five years ago there were considerably less than 100,000 of these independent stations so connected.

The independent stations are nearly all in rural districts, were installed by local people and were operated along provincial lines until the American Telephone and Telegraph Company saw fit to widen the scope of its public usefulness and made these companies a part of its own 3,000,000 odd stations.

These connected stations represent at least 5,000 companies commonly classed as "independents," but which in everything except local service are a part of the Bell system.

An electric duck-feeder is said to have been devised by an Arizona genius who noticed that an electric light attacted bugs which domestic ducks regard as a delicacy. By placing the light in the center of a pond the ducks are able to feed upon the insects as they fall into the water.

The little town of Woodbury, Conn., has a population of 2,000 people and was named in 1674. It is a modern town in every respect, prosperous in a manufacturing way, and blessed with an electric lighting plant of most modern design, but up to within the past few months it has depended for transportation of both feight and passengers on the old fashioned stage coach and freight wagons. This condition was recently changed when the new trolley line running from Waterbury to Woodbury, for which a charter was secured sixteen years ago, was formally opened and a car containing President Mellen and other officials and directors of the New York, New Haven & Hartford Railroad and Connecticut Company rolled into the town about noon. The car was greeted with cheers, blowing of whistles and ringing of bells, as the citizens saw in its coming the passing of the stage coach period. The formal exercises included a speech of welcome by Asa W. Mitchell and a response by President Mellen.

European Water-powers, according to a German engineer, Otto Mayr, total 34,151,600 h. p. Norway leads with 7,525,000 h. p. available, of which only 301,000, or 4 per cent is utilized; Sweden follows with 6,750,000 h. p. available and 200,000, or 2.9 per cent used; Italy, with 5,500,000 h. p. available, and 464,000, or 8.43 per cent, used; France, 5,524,000 h. p. available, and 1,190,800, or 21.50 per cent, used; Austria, 5,125,000 h. p. available, and 450,000, or 8.78 per cent, used; Germany, 1,677,600 h. p. available, and 503,300, or 30.01 per cent, used; Switzerland, 1,500,000 h. p. available, and 380,000, or 25.33 per cent, used; and Hungary, 550,000 h. p. available, and 65,000, or 11.81 per cent used. These figures give a total of 34,554,100 h. p., or 10.41 per cent, is utilized. They are, however, only a rough approximation, as, in the case of Italy and Switzerland, the data are brought down to the end of 1905 only, and in the case of France and Germany they are for the year 1907. With regard to Italy, the Giornale dei Lavori Publici remarks that at the end of 1906 the water-power used totalled 830,000 h. p., or a percentage of 15.27 per cent. Of this 830,000 h. p., 740,000 was transformed into electrical energy and 90,000 applied directly.